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US-PAT-NO: 6141568  
DOCUMENT-IDENTIFIER: US 6141568 A  
TITLE: Battery saving in portable radio  
apparatus

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Brief Summary Text - BSTX (3):

The present invention relates to a portable radio apparatus such as a portable telephone and a portable computer, and particularly relates to battery power saving technique in a portable radio apparatus which has a battery and a backlighting type liquid crystal display unit.

Brief Summary Text - BSTX (5):

A portable radio apparatus such as a portable telephone and a portable computer generally includes an image display section on which transmitted or received information is displayed. Such an image display section is often made of a liquid crystal display section, which is lighted up by a lighting source such as a backlighting source to make it easy to confirm the information. When a user regards the lighting as unnecessary in the daytime, the user freely operates a button to turn off the backlighting source so that the battery power can be saved.

Brief Summary Text - BSTX (6):

Another information such as use state information, for example, the reception electric field strength, the remaining battery power and so on, is also displayed in addition to the transmitted or received

information. Such a use state information is effective if the user regards the information as the warning. Therefore, the lighting is wasteful when the portable radio apparatus is kept without being used, when it is ready for receiving or transmitting a radio signal, and when the user does not look at the image display section. Thus, it is desirable that a backlight is turned off by means of turning-off means in the above cases so as to save the power of the battery. It is more desirable that the use state information is not displayed to save the battery power while the information is unnecessary.

#### Brief Summary Text - BSTX (13):

The present invention is accomplished to solve the above problems. Therefore, an object of the present invention is to provide a portable radio apparatus such as a portable telephone and a portable computer, the liquid crystal display section which is controlled to be automatically turned on and off so as to save battery power, and a method for the same.

#### Detailed Description Text - DETX (21):

As described above, according to the portable radio apparatus of the present invention, the presence or absence of any interrupt request generated based on the operation of any of the specified buttons such as the dialing buttons is checked at all times. If such an interrupt request is present, the portable radio apparatus understands or considers that the user is looking at the liquid crystal display section 2 while the user manipulates the buttons. The portable radio apparatus resultantly understands or considers that the use state information should be displayed to the user for any warning or announcement.

If such an interrupt request is absent, the portable radio apparatus understands or considers that the user does not look at the picture of display section 2, or it is kept out of use, or it is waiting for receiving radio wave or under communication. In such a case, the liquid crystal display section and the backlight are turned off to save the electric power so that it is not wastefully used or it does not wastefully display any use state information.

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US-PAT-NO: 6021502

DOCUMENT-IDENTIFIER: US 6021502 A

TITLE: System for monitoring power  
consumption of semiconductor  
devices

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Brief Summary Text - BSTX (7):

One of the common approaches for reducing power consumption is to supply a minimum needed amount of power when no operations are required. This approach may be implemented via software. In a computer, for example, when no programs are currently being executed (in an idle state) and no inputs are entered from a keyboard and a mouse for a given period of time, the operating system of the computer judges that there is no need to subsequently operate for some time to decrease the clock rate of a CPU or the brightness of a monitor.

US-PAT-NO: 6076171

DOCUMENT-IDENTIFIER: US 6076171 A

TITLE: Information processing apparatus  
with CPU-load-based clock frequency

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Detailed Description Text - DETX (96):

According to such an embodiment, as the demand for the CPU power of the computer system decreases due to less frequencies of use of the computer system by the user, the brightness of the display unit lowers. That is, this embodiment is designed to control the brightness of the display unit based on the concept that "less use degrades the function". Consequently, power consumption can be reduced without causing the user discomfort also by this brightness control.

*portable computer*

US-PAT-NO: 5696952

DOCUMENT-IDENTIFIER: US 5696952 A

TITLE: Dynamic speed switching software  
for power management

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Brief Summary Text - BSTX (4):

There are many reasons to conserve power in modern electronic devices. Many people are increasingly aware that power is a limited resource and it is advantageous to save power whenever possible. Power management has become an important issue for designers of many electronic devices.

This is particularly true for computer systems, but is also useful for devices such as televisions, monitors, stereos and other audio/visual equipment, facsimile machines, telephone answering machines, and the like.

Brief Summary Text - BSTX (5):

In many instances, such as a facsimile machine or telephone answering machine, very little system activity is required while waiting for a condition of interest, such as a ringing telephone. In a similar way, a computer which is connected to a network may require very little activity while monitoring network traffic, watching for a call to that specific computer. Once the condition of interest (a telephone call or a network call) is detected, the system generally needs additional resources to execute the procedure appropriate for the condition of interest, such as demodulating and processing a facsimile transmission, or providing some sort of file

response, e.g. reading  
or writing a requested file.

#### Brief Summary Text - BSTX (7):

Many modern systems implement some form of energy saving procedure, such as turning down or turning off any component which can be safely modified without affecting system performance. One option would be to turn down or turn off any components which are not being used. For example, many computer monitors can respond to a variety of commands to, for example, first reduce the brightness of the display, then, ultimately, effectively turn off the display, yet holding the display in a state that can quickly be restored to normal operating conditions. Screen savers are quite common on modern personal computers. One form of screen saver dims the image on a monitor after some preset period of time or upon activation by a command. This reduces the amount of power consumed by the monitor. One useful program for dimming a monitor screen after a preset time is the Energy Saver control panel from Apple Computer (Cupertino, Calif.), available with Apple's System Software 7.5. Other components may be shut down as well. For example, the CPU Energy Saver control panel (from Apple Computer) can be used to turn off a computer after a preset time. This program is specifically designed to work with Apple computers which include soft power on/off, but one skilled in the art could design a similar system for other systems with appropriate hardware capabilities. Portable computers, such as Apple Computer's 520, 520c or 540c, often include software that will monitor hard disk activity and spin down the hard disk after a preset period of inactivity, thereby saving energy.

Brief Summary Text - BSTX (10):

External devices of particular interest include network services such as AppleTalk or EtherNet and communication services such as telephone and facsimile, which might be monitored using GeoPort. It would be advantageous if the computer of interest could monitor these services to detect any signal directed or addressed to the computer, then transition smoothly to a higher, usually full, speed state to service the signal and capture or respond to any attendant communication. One such example would be to monitor a telephone line while in a low power state. If an incoming call is detected, the system could transition to a normal speed state to activate call-responsive services such as answering the telephone, monitoring for facsimile or data modem signals or voice, provide an appropriate response, such as receiving, storing and printing a facsimile or capturing and logging a voice message. Once the communication has been handled, the computer system can remain in the high speed state for a pre-selected period of time, then return to the low speed state.

Brief Summary Text - BSTX (12):

The speed transition is generally difficult for traditional computers. For example, a portable computer such as a PowerBook might be connected to an EtherNet network. If the portable is capable of going to a slow, low-powered state ("sleep mode") but is not capable of dynamic speed switching, the transition between speeds can be problematic. A typical portable has a preferred system operating speed, e.g. 33 MHz. The relationship of the system operating speed to the speed of another service such as servicing EtherNet packets is generally at a fixed ratio. This ratio will have one value for the



slow system operating speed, and a different ratio for the normal system operating speed.

Brief Summary Text - BSTX (13):

Solutions used in the past provide some benefit but do not go as far as the present invention. Older portable computers, notably older Macintosh PowerBook products, used an "economode" in which the computer could be run at a different speed (frequency) after restarting the machine. The available speeds are generally "hard-coded" into such machines. Newer portable computers, notably newer Macintosh PowerBook products, utilize a technique called "processor cycling" to dynamically change the speed of the processor, thereby reducing power consumption. Some processor cycling implementations actually turn the processor on and off rapidly enough to effect a "slower" CPU speed. When processor cycling, the machine's processor will resume full power operation upon any external interrupt. However, certain types of interrupts may not warrant full power operation. For example, if a floppy disk needs to be ejected, there may be no need to resume full power operation of, for example, the monitor or in some cases even the hard disk.

US-PAT-NO: 6052791

DOCUMENT-IDENTIFIER: US 6052791 A  
\*\*See image for Certificate of Correction\*\*

TITLE: Control method for a hard disk  
drive and a data processor reducing power  
consumption of the hard disk  
drive

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Detailed Description Text - DETX (8):

A display controlling Device (VGA-CONT) 14 controls display output on the display (LCD) with regard to the display data developed on the video-RAM (VRAM) under the controlling of CPU 10. Here, predetermined display power save processing is implemented such as brightness decreasing (for example, back-light illumination-down), display interruption (for example, back-light-off), and so forth, in accordance with the content of the display power save register (DPR) 15.

US-PAT-NO: 5952992  
DOCUMENT-IDENTIFIER: US 5952992 A  
TITLE: Intelligent LCD brightness control system

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Brief Summary Text - BSTX (7):

While foregoing manual brightness adjustment presents a viable option for increasing the runtime of a PC between charges, it is deficient in certain respects. In particular, while a user may begin by operating the PC with the LCD brightness set to the minimum level necessary to enable the contents of the display to be perceived, after a user has moved with the PC to an environment in which the ambient lighting conditions require that the LCD be set to the maximum brightness level, the user will typically forget to decrease the brightness level upon returning to an environment in which the ambient lighting conditions would be conducive to such a decrease. As a result, the power savings are not as substantial as might be the case were the brightness adjustment to occur automatically.

US-PAT-NO: 5768602

DOCUMENT-IDENTIFIER: US 5768602 A

TITLE: Sleep mode controller for power management

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Brief Summary Text - BSTX (7):

Many modern systems implement some form of energy saving procedure, such as turning down or turning off any component which can be safely modified without affecting system performance. One option would be to turn down or turn off any components which are not being used. For example, many computer monitors can respond to a variety of commands to, for example, first reduce the brightness of the display, then, ultimately, effectively turn off the display, yet holding the display in a state that can quickly be restored to normal operating conditions. Screen savers are quite common on modern personal computers. One form of screen saver dims the image on a monitor after some preset period of time or upon activation by a command. This reduces the amount of power consumed by the monitor. One useful program for dimming a monitor screen after a preset time is the Energy Saver control panel from Apple Computer (Cupertino, Calif.), available with Apple's System Software 7.5. Other components may be shut down as well. For example, the CPU Energy Saver control panel (from Apple Computer) can be used to turn off a computer after a preset time. This program is specifically designed to work with Apple computers which include soft power

on/off, but one skilled in the art could design a similar system for other systems with appropriate hardware capabilities. Portable computers, such as Apple Computer's 520, 520c or 540c, often include software that will monitor hard disk activity and spin down the hard disk after a preset period of inactivity, thereby saving energy.

US-PAT-NO: 6016407  
DOCUMENT-IDENTIFIER: US 6016407 A  
TITLE: Energy saving electronic device

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Detailed Description Text - DETX (6):

A camera with a display function has a shooting mode in which it performs shooting (photographing) of the object, and at least one operation mode other than the shooting mode. Thus, the camera includes mode setting means 1 that switches between the plurality of the operation modes in response to an external operation, e.g., manual actuation of a switch. Of course, other forms of actuation, such as, e.g., by remote control are possible. An operation controller 2 controls an operation of a camera in response to an operation mode set through the mode setting means 1. Display 3 displays image data or display data, which is formed in response to the operation of the camera, on a screen. The camera further comprises memory 4 to store a corresponding relationship between an operation mode and a display limit time created in advance. This is done by assigning a particular display limit time to each of the plurality of operation modes. Time setting means 5 obtains the display limit time assigned to the currently selected operation mode, based upon the corresponding relationship stored in the memory 4. Power-saving means 6 decreases or turns off the display brightness of the display 3 when the display time of the display 3, during a non-operation state (an uninterrupted period of time during

which the camera is not manipulated), exceeds the display limit time obtained by the time setting means 5.

Detailed Description Text - DETX (10):

The camera also includes a memory 14 that stores the corresponding relationship between the usage geography and the display limit time created in advance. A time setting means 15 attains the display limit time to be assigned to the current usage geography. A power saving means 16 decreases or turns off the display brightness of the display 12 when the display time of the display 12, during a non-operation state, exceeds the display limit time obtained from the time setting means 15.

time

US-PAT-NO: 6532152  
DOCUMENT-IDENTIFIER: US 6532152 B1  
TITLE: Ruggedized hand held computer

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Detailed Description Text - DETX (26):

Upper housing shell 204 comprises an aperture 210 through which touch input overlay device 212 is accessible and display device 114 is viewable. Display 114 and touch screen overlay 212 are the dominant features on the front (viewable) surface of computer 200. Because of power consumption considerations, and especially since LCD screens typically provide satisfactory viewing contrast under most direct lighting conditions, where a back light is employed, it is preferable to include a selective back light disablement feature that may be manual, controlled by user-operated software, or automatically disabled and enabled depending on available light or remaining battery life. For example, available light may be detected by a photosensor (not shown) located on the surface of housing 202 and the backlighting or LCD brightness adjusted in response thereto. As an alternative or additional scheme, backlighting may be reduced or disabled as a part of a power management scheme, as where backlighting may be reduced or screen brightness otherwise reduced, when the battery voltage output drops below a predetermined level or when remaining battery life (e.g., as calculated by power management or intelligent battery software) reaches a predetermined amount. Backlighting



may also be automatically temperature compensated to adjust for differences in luminescence over a range of temperatures. For example, the range of temperatures likely to be encountered by the computer 200 during operation is generally from about -4.degree. F. to about 125.degree. F.

US-PAT-NO: 6552711  
DOCUMENT-IDENTIFIER: US 6552711 B1  
TITLE: Display device and information  
terminal

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Brief Summary Text - BSTX (5):

The present invention relates to a display device capable of displaying a color image and an information terminal using the same display device and, particularly, to a display device for displaying an image by using liquid crystal and an information terminal such as portable telephone set in which the same display device is incorporated to display an information.

Brief Summary Text - BSTX (7):

With the development of the digital technology and the communication technology, the multi-media industries handling data containing moving picture and voice have been expanding at high rate. For example, most of electronic devices such as portable telephone sets and mobile personal computers can be connected to other electronic devices or servers through cables or radio wave to take in or transmit various information. In the following description, not only the portable telephone set or PHS (Personal Handy-phone System) but also all of electronic devices functioning as terminals will be defined as information terminals and the term "information terminal" will be used in the above meaning.

Brief Summary Text - BSTX (10):

On the contrary, in a display for displaying a color image, the image is displayed by using three primary colors RGB (Red, Green and Blue). Therefore, drive circuits corresponding to these primary colors are required, whose circuit constructions become complicated and consume power correspondingly when many tones are to be displayed. Further, in order to display an image with natural color including many color tones, it is necessary to always light a back-light for illuminating a rear side of liquid crystal with enough brightness thereof. In view of this fact, it is usual to use the monochromatic liquid crystal display in a device such as portable telephone set which is small in size and whose battery capacity is small.

Brief Summary Text - BSTX (11):

FIG. 7 shows an example of a construction of a color liquid crystal display for use in a portable telephone set as a conventional information terminal capable of receiving multi-media, which is disclosed in JP-A 6-301032, color liquid display 100 is constructed with color light radiation source 101, liquid crystal display panel 102 and liquid crystal shutter 103 arranged between color light sources 101 and liquid crystal display panel 102. Color light radiation source 101 is constructed with color light sources 101R, 101G and 101B such as fluorescent lamps, tungsten lamps or CFL tubes corresponding to the three primary colors. In a case where these light sources are candescent light sources, three primary color filters are provided in front of these light sources, respectively. When color light sources 101R, 101G and 101B are ON/OFF controlled frequently corresponding to colors of an image, there is a problem

that the life of color light radiation source 101 composed of fluorescent lamps, etc., is shortened. When the color light radiation source 101 is composed of tungsten lamps, there is a problem that the response to a color change is degraded.

Drawing Description Text - DRTX (9):

FIG. 7 shows an example of a construction of a color liquid crystal display of a portable telephone set as a conventional information terminal capable of receiving multi-media;

Detailed Description Text - DETX (18):

On the other hand, display data other than sound data, which is received by controller 203 from the RF part 202 or input unit 204, is sent to display data controller 206. In display data controller 206, the display data is classified to color display data and other display data (monochromatic display data) for the purpose of reduction of power consumption of back light 253. If no color display data including color moving picture is outputted, back light signal 254 used to light on back light 253 is turned to an OFF state to substantially reduce power consumption thereof. This is because, in the monochromatic display, it is usually possible to display binary image by reflection of the liquid crystal itself, etc.